Quantum Dot-Conducting Polymer Hybrids with Tailored Energy Levels for Efficient Light Emitting Diodes

임재훈[1,2], Lisa zur Borg[3], 이동구[4], 박명진[4],
Rudolf Zentel[3], 이창휘[4], 차국헌[1,2,*]
[1]서울대학교 지능형유도조합체 창의연구단;
[2]WCU 에너지환경 화학융합기술 전공;
[3]Institute of Organic Chemistry, Johannes Gutenberg-Universität Mainz, Germany;
[4]서울대학교 전기컴퓨터공학부
(khchar@plaza.snu.ac.kr*)

Light emitting diodes (LEDs) based on quantum dot (QD)-conducting polymer hybrids have attracted huge attention to the display industry, due to their exceptional spectral purity as well as improved solution processibility. However, extensive research on the hybrid LEDs have been hampered by low external efficiency and stability, originating from the large hole injection barrier between HOMO level of conducting polymer ligands and VB of QDs. In order to improve the device performance of the hybrid LEDs, we demonstrated the QD-conducting polymer hybrid LEDs with reduced hole injection barrier. Decrease in the energy gap between VB of QDs and HOMO level of conducting polymer ligands below 0.3 eV enables us to accomplish improved quantum efficiency as well as elongated lifetime.